Symons's Meteorological Magazine.

No. 647. DECEMBER, 1919. Vol. LIV.

John Aitken, LL.D., F.R.S.,

FALKIRK, 1839—13TH NOVEMBER, 1919.

THE death of Dr. John Aitken deprives Meteorology of a very ardent and singularly gifted student. He was a brilliant example of a type which has done much to mould the history of science in Great Britain since the revival of natural knowledge in the sixteenth century. Like Napier of Merchiston, Boyle, Cavendish, Banks, Murchison, Campbell of Islay, and many others, he had sufficient means to devote his best years to scientific investigation untrammelled by the necessity of toiling at a profession or of conforming to the traditions of an institution. An apprenticeship in an engineering works gave him a practical knowledge of mechanical processes which he turned to good account during the many years of quiet country life at Darroch and Ardenlea, near Falkirk, which his uncertain health required. His appearances at meetings of the British Association and various learned societies were infrequent; but whenever he spoke on any of the subjects with which his mind was occupied, he commanded attention by the originality of his methods and the actueness of his observation. He was an adept in devising apparatus to test points of physical theory, and his demonstrations were always as simple and direct as they were conclusive. Had health and circumstances permitted, Dr. Aitken would have been an inspiring professor; but as events fell out he perhaps did more in the way of important investigations by his unaided and unhurried industry than all his hypothetical students might have accomplished.

The summary of his work in "Who's Who," may be taken as his own estimate of the relative importance of his researches and in it he says:—

> "Has investigated and written papers in the publications of the Royal Society, London, and Royal Society of Edinburgh, on 'Colour and Colour Sensation,' 'Rigidity produced by Centrifugal Force, Dust, Fogs and Clouds,' Colour of Water,' 'Dew,' 'Apparatus for counting the Dust Particles in the

Air,' 'Observations on the number of Dust Particles in the Atmosphere of different places in Europe,' 'Hazing effect of Atmospheric Dust,' 'Cloud Particles,' Cyclones and Anti-cyclones,' 'The Sun as a Fog Producer,' etc. Has invented instruments for counting the dust particles in the atmosphere, chromomictors and the Koniscope."

Probably the name of John Aitken will be associated more particularly with the discovery of the place of dust in the functions of the atmosphere, and to the revision of the theory of dews, but his services to experimental meteorology are much more extensive. His valuable researches on the measurement of air temperature have never been fully appreciated by meteorologists and it is to be feared that they are little known. They deal almost exhaustively with the effect of radiation on thermometer bulbs of different size and surface, with the effect of shelter in thermometer screens, the influence of a current of air flowing over the bulbs and the possibility of securing such a current by the use of a chimney of appropriate size and suitable surface.

At the time of his death Dr. Aitken was studying the grass minimum temperatures recorded in different parts of the country this autumn, and in correspondence with the writer of this notice on the discrepancies between the readings at various London stations, his handwriting was as firm and his grasp of the problems of radiation temperatures as sure as they were forty years ago.

To Dr. Aitken his researches were everything. He shrank from public appearances and had no ambition to take a leading part in the conduct of scientific societies. He was equally indifferent to the conventional opinions which dominate so many scientific workers, and cared little for scientific orthodoxy if the plain leading of observation and experiment ran athwart its canons.

In the days of the Scottish Marine Station and the Ben Nevis Observatory, he co-operated with Dr. Buchan, Sir John Murray, Prof. P. G. Tait, Prof. Chrystal and Sir Arthur Mitchell in promoting research in the deep sea and the upper air at a time when those researches were viewed with profound indifference in most parts of this country, and all that he wrote both in those early days and later is well worthy of attention now when the tide of general interest has been directed into the channels where he was a pioneer.

H.R.M.

METEOROLOGICAL OFFICE FORECAST SERVICE.

On November 18th, the Forecast Branch of the Meteorological Office was removed from Exhibition Road, South Kensington, S.W., 7, to The Air Ministry, Kingsway, W.C. 2.

THE USE OF AEROPLANES IN METEOROLOGY.

By C. K. M. Douglas,
Late Pilot of the R.A.F.

The recent development of the aeroplane has provided a method of upper air research, which has some advantages over any other method, as the instrumental observations may be combined with direct observation of cloud formations. The author took part in upper air observations carried out by aeroplanes at Berck, in north-east France, between February, 1918, and May, 1919, in co-operation with the Meteorological Section, R.E., under the direction of Lt.-Col. Gold, D.S.O., F.R.S., primarily for the artillery, but also as an aid to forecasting. The observations included temperature, humidity, visibility and also observations of cloud forms, assisted by the photographic camera. The results achieved showed what might be accomplished if observations were made regularly at a number of stations.

One result of such observations would be an increased knowledge of cloud formations and of their value in forecasting. The clouds have not hitherto attracted the attention they deserve, among most meteorologists, but the application to forecasting of ordinary observations made with the International code is by no means easy. An experienced observer of clouds and of local weather not infrequently makes a more accurate prediction than the forecaster with a synoptic chart, especially in the remoter districts in the west and north. At the same time the enormous advantage of the synoptic method is obvious, when it is realised that our weather may be completely changed within twenty-four hours as the result of a complex series of causes operating over any or every part of western Europe, the eastern Atlantic and the Arctic Sea. Observations of clouds can only be of value in so far as they can be used in conjunction with other observations and add to our knowledge of the dynamics and physics of the atmosphere. Aeroplane observations of the temperature and humidity of the air, combined with the view of the clouds over a vast area which the observer obtains, provide a means both of adding to our knowledge and of making more use of cloud observations in forecasting. The principal object at which to aim is a clearer understanding of the causes of our various weather phenomena—a most fascinating branch of study.

Even so simple a factor as the vertical stability of the atmosphere is of great importance in connection with thunderstorms and allied phenomena. A necessary factor for thunderstorm development is a large temperature difference between the lower layers and the layer between 10,000 and 15,000 feet. Thunderclouds tower up to great heights, well above 20,000 feet in the case of severe storms. If their growth is checked below 12,000 feet no storm will develop, except perhaps in rare instances when the clouds are very low and

there is a very rapid lapse of temperature in the lower layers. No storm of any severity is probable unless the clouds can grow above 15,000 feet. The actual disturbance originates in the lower layers, and is much affected by local features at the surface ; but the favourable condition may exist over a large area, so that thunderstorms may occur in various parts of the country for several successive days, and on another occasion with similar surface conditions they fail to materialise. An unusually violent outburst is usually the result of marked instability, with enough moisture in the lower air to supply the necessary energy.

Figs. 1 and 2 show cumulo-nimbus clouds, with their tops at about 20,000 feet. The first photograph was obtained from 12,000 feet on the evening of July 14th, 1918, and shows a part of a cumulo-nimbus mass which continued for some distance beyond the right of the picture with a typical "anvil" of false cirrus. The part shown in the photograph had recently grown up and was in the transition stage between water-drops and ice-crystals, but it soon afterwards assumed the same appearance as the rest of the anvil (*i.e.*, it consisted of snow). There were extensive low clouds, the day being warm and moist, and the cumulo-nimbus clouds caused heavy rain, but not violent thunder, as there was no marked instability. The thin strips of cloud in the foreground were at 10,000 feet. Fig. 2 shows large cumulus, and cumulus protruding through a layer of cloud at 8,000 feet, the top of the former being at 12,000 feet and of the latter nearly 20,000 feet. There were heavy local showers and a little thunder. The photograph was taken over the sea, looking west, in the evening of September 23rd, 1918, with very low temperature in the upper air, which belonged to a north-west current behind a depression. The base of the clouds was at 2,500 feet, and they easily grew through the layer at 8,000 feet, although the conditions at that particular height were just stable enough to permit of a horizontal sheet of clouds.

It is plainly of great importance to determine the factors which influence the upper air temperature, in order, if possible, to foretell the changes in advance. Mr. W. H. Dines, F.R.S., has shown that the temperature in the upper air is closely related to the pressure, the correlation co-efficients being ·77 at three kilometres, and ·84 at four kilometres.* But these co-efficients, though high, still allow some influence for other factors. The simultaneous observations of wind and temperature in France (some 500 in all) showed that the source of the air supply has a considerable influence on its temperature.

When pressure is low for a few days over Scandinavia and high over, or to the westward of, Iceland, the polar current resulting always causes extremely low upper air temperatures over Britain and north

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* **Geophysical Memoirs, No. 13.**

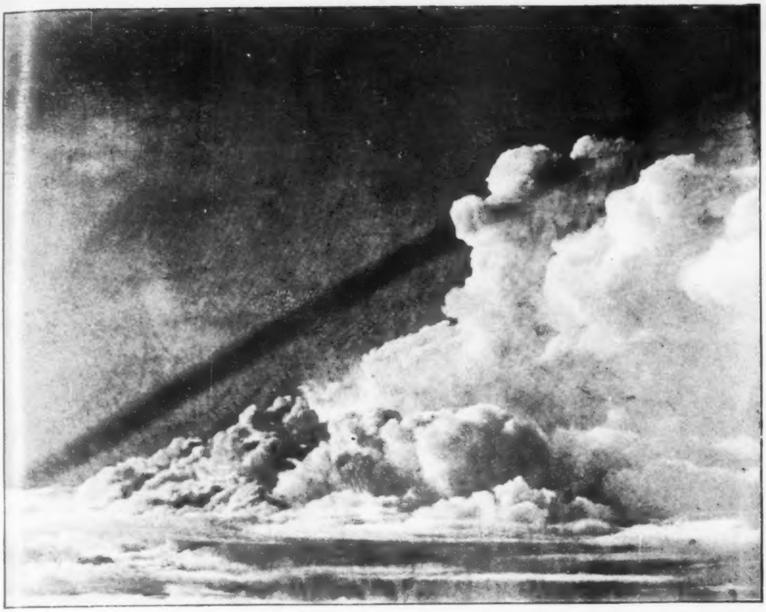

Fig. 1. July 14th, 1918. Cumulo-nimbus up to 20,000 feet.

Fig. 2. September 23rd, 1918. Large cumulus and cumulo-nimbus, protruding through cloud-sheet.

France. The squally showery weather characteristic of the north-westerly currents is a result of the low upper air temperatures, and the tops of the showers frequently exceed 15,000 feet. When the upper air is in steady horizontal motion it tends to change its temperature very slowly, so that a polar current must be cold. Very often a cold current curves round a depression and arrives from south-west, or even south, and in the same way a warm current may curve round an anticyclone. Once cold air is widespread a change of wind may not produce an immediate effect. The result of these considerations and of the dominant effect of the pressure is that north winds at 10,000 feet (3 kilometres) are only on the average a few degrees colder than south winds. But the extreme variations caused by currents from a very cold or warm source are much greater. When deep depressions are passing some distance to north or north-west, the changes due to a succession of warm and cold currents may amount to 15° or 20° F. at 10,000 feet, and the normal relation between the pressure and the temperature at that level may be reversed for twenty-four or forty-eight hours.

Mr. W. H. Dines attributes the relation between pressure and temperature in the upper air largely to air being transferred from the cyclone to the anti-cyclone (during their development) at about nine kilometres, with the result that the air in the cyclone bulges up and is cooled, while the air in the anticyclone is forced down and dynamically warmed. It is possible to accept this theory and at the same time to stipulate that there are other variations due to the origin of the air supply, as the two factors are independent and their effects may be super-imposed. Even in anticyclones, where the relation between the temperature and pressure in the upper air is normally most perfect, there are variations in the temperature and humidity observed at a single station, which are due to the horizontal rather than to the vertical motion of the air. The air which descends is very dry and its lower limit is usually marked by an inversion, *i.e.*, an abrupt rise of temperature for a few hundred feet. But the level and the magnitude of the inversion may vary considerably in quite a short time, and near the edge of the anti-cyclone it may disappear and then reappear again without much change of pressure. In these conditions the warm dry layers probably travel great distances almost horizontally. Again, warm damp layers may exist at any height in an anticylone, often above a very dry layer, and these layers must owe their warmth to their place of origin, as they cannot have been warmed for some time past. Warm damp layers of great depth, with much medium and high cloud, are often found round the northern boundaries of anti-cyclones, and sometimes in front of depressions. The relation between these warm damp currents and the very cold dry polar currents is a subject of great interest and importance, of which little is yet known. Systematic cloud observations, especially if

combined with regular information of upper air temperatures and humidities, should throw light on the subject.

But we are here concerned less with the forces controlling the large atmospheric movements than with the weather changes resulting therefrom, and their relation to the temperature and cloud distribution in the upper air. These subjects will be further considered in the second half of the article.

(*To be continued*).

Correspondence.

To the Editor of Symons's Meteorological Magazine.

WIND IN RELATION TO TIDE.

I HAVE read with interest the letter from Mr. Twist in the October number of *Symons's Meteorological Magazine* on "Wind in relation to tide," and note that he invites opinions and experiences.

For several years I was a lighthouse keeper at the Chapman lighthouse, situated near Southend, and took particular notice of the winds and tides.

I am inclined to the opinion that the tides do have some influence on the wind, but not to the extent which most fisherfolk will claim for them. For instance, in heavy winds I have repeatedly noticed that no difference of direction or force could be observed, but, on the other hand, with light winds (from force 3 to 6) I have often observed an increase of force with the flood tide with a westerly wind and a decrease of force with the ebb tide ; and the reverse for an east wind. I have mentioned this to the mate of the Nore lightship, and he fully agreed with the foregoing statement, and added, that his experience, speaking generally for the English coasts was, that any wind increases with the ide running to windward, and decreases with the tide in the direction of the wind.

At the Chapman lighthouse, I endeavoured to make a tangible statement concerning the direction of wind in relation to tide, but gave it up as hopeless, because the wind's direction would repeatedly change at any state of the tide from high to low water. However, fisherfolk and 'longshoremen will say, the direction of the wind will change under such and such conditions of tide and wind.

GEO. E. DANES.

58, Upperton Road, Plaistow, E. 13., 7th November, 1919.

LIGHTNING FIGURES.

DR. NEWELL's note in the October number, on "tree markings," on the body of a man killed by lightning, recalled to me a paper by Mr. Symons in *Meteorological Magazine*, vol. **18**, pp. 81 seq., in which, after having cited numerous similar instances, and described a photograph of a then recent case, he came to the conclusion that the markings were "not referable either to a tree, or to photographic action, but simply to the well known ramification of an electric discharge." As in one instance given one person struck was within a stable, while his companions were outside and all were marked alike, and another occurred on open ground, where there was no tree near, his first conclusion seems inevitable.

This paper was followed on pp. 104, seq, by another, from Prof. Tomlinson, who had read a paper on the subject before the British Association in 1861, and while agreeing with Mr. Symons as to the mode of production of the marks, differed in some details. A further note from Mr. Strachan appeared on p. 120.

I need not do more than give your readers these references, which will show that so far from this phenomenon being unusual, it is of not infrequent occurrence, and is well authenticated.

JAMES G. WOOD.

115, Sutherland Avenue, W. 2, November, 1919.

THE INTENSE FROST OF NOVEMBER, 1919.

A SPELL of severe winter cold in November, like a spell of hot summer weather in the oppositely-placed month of May, is one of the most constant features of the English climate.

In the north of England and Scotland skating-frosts and deep snows in November are common enough, and quite recent years, 1909, 1912 and 1915 were prominent examples. The recent spell of Arctic November weather with minima in Scotland approximating to 0° F. and maxima in places below 20° was chiefly remarkable in this : that its intensity was unusual not only for the *first half* of November, but even for January or February, and it only shows what may be expected given the right conditions of air circulation in the high latitude of Scotland during the period of the low solstice. It is interesting to note, too, that the advance guard of this November invasion of cold arrived as far back in the autumn as the third week in September—around the 20th, when we experienced in a manner far more drastic than usual one of these cold draughts from the polar regions which occur every September as a sure indication of the passing of summer. It will be recalled, also, that October, 1919, was prevailingly bleak and frosty.

L. C. W. BONACINA.

27, Tanza Road, Hampstead, N.W. 3, November 30th, 1919.

SNOW FOLLOWING FINE WEATHER.

In my note to you of March 5th I did not say the above but "A glorious soft warm sunny day, a striking contrast to the previous weather," etc.

Mr. ffarington's tables do not therefore apply. On looking back, I find :—

In 1912—No days answering that description.
1913— " " " "
1914— " " " "
1915—March 6—Very soft and warm, maximum, 55°.
" 8—Bitterly cold hard N.E. wind, particles of snow.
1916— " 18—Lovely calm day, best this year, maximum, 54°.
" 21—Rain all day, turning to snow in the evening.
1917— " 17—Lovely day, first spring day, maximum, 54°; first with maximum above 50° since January 2nd.
" 20—Heavy snow, 7—10.30 a.m.
1918—Feb. 23—Lovely warm spring day. No snow followed directly, but a hard bitter N. wind and on the 28th, snow, with wintry weather.

At any time of the year a cold snap is often ushered in, as it were, by a short spell of extra warmth, and *per contra*, the hardest frosts, often occur just before a thaw. There must be some atmospheric condition to account for these facts. CHARLES P. HOOKER.

Cirencester, September, 28th, 1919.

ROYAL METEOROLOGICAL SOCIETY.

The first ordinary meeting of the session was held on November 19th, in the Society's rooms, 70, Victoria Street, S.W., Mr. F. J. W. Whipple, Vice-President, in the chair.

Lieut. C. W. B. Normand, of the Indian Meteorological Service, read a paper on the "Effect of high temperature, humidity and wind on the human body." The climatic conditions under which a wet bulb restricted to a certain maximum rate of evaporation and having an initial temperature of 36°·5 C., will neither gain nor lose heat were derived from kata-thermometer and wet-bulb formulæ. The application of these results to the human body was considered, and on the assumption that conditions resulting in a rise of body temperature above 36°·5 C. must be fatal, the upper limits to climatic conditions under which human life was possible were deduced. The scorching and sometimes deadly simoom of tropical deserts was considered to be a case of the onset of a high wind, without necessarily a change of temperature or humidity

converting livable into unlivable conditions. The suggestion was made that an essential feature of heats-trokes may be that a portion of the body has been exposed for a time to air conditions which are above the limit for existence. The wet kata-thermometer and wet-bulb formulæ were found to furnish quite discordant results regarding the behaviour of a wet surface under varying wind velocities and it was suggested that this discrepancy was due to a less efficient wetting of the kata-thermometer bulb and to a consequently restricted rate of evaporation from it.

Dr. Leonard Hill thought that the discordancy between the wet-kata and the wet bulb thermometers was more probably due to sheltering effects than to drying. He believed heat-stroke was caused by fatigue of the sweat glands. In hospitals in Mesopotamia many lives had been saved by covering the patients with wet sheets, which were fanned in order to set up artificial perspiration. He urged the need of further observations and experiments. Captain Evans, R.A.M.C., said his Persian servant had told him that the most effective way to withstand the effects of the simoom was to lie down, burying the hands and face under the clothing, thus shielding the body from the wind, the effect of which was more disastrous than the high temperature. The critical temperature for heat-stroke might vary from 105° to 120° F., or even more in different individuals. He knew cases where patients suffering from heat-stroke had completely recovered from a body temperature of 110° and some had stood 111° with impunity. Lieut.-Col. Martin Flack said that the keynote to perfect health was great vital capacity. A man with good respiratory force got plenty of lung evaporation. A stuffy atmosphere and sendentary life brought about poor evaporatory force and poor vital capacity.

Capt. A. J. Bamford read a paper on "Some observations of the upper air over Palestine." The observations were all made during the last two years. Tables and graphs showed the monthly averages of the horizontal movements at different altitudes over three stations, at one of which (near Ramleh) observations were kept up continuously for a year. Attention was called to the agreement between the results found and the general summary in Prof. Hildebrandsson's "*Mouvements généraux de l'atmosphère.*" These flights were observed for the first few (usually fifteen) minutes with two theodolites, or a theodolite and a range-finder, the upper part of each ascent being observed with a theodolite alone. The paper also dealt with vertical velocities and included frequency curves, showing for each of the layers, 0-2000, 2000-4000, 4000-6000 feet, the number of times in each month that the observed velocities differed from the theoretical ones by not more than 10, 20, 30 or 40 per cent. etc. The lowest layer was appreciably the most varied, and in it differences of 50 per cent. were not unusual, although the average velocity differed very slightly from theory. In the other

layers there was a distinct increase in the compactness of the frequency curves, while the average velocity changed from slightly above to slightly below the theoretical value.

Mr. J. S. Dines said the correctness of the formula given depended on the size of the balloons. He had found that large balloons went up faster than small ones. Mr. F. J. W. Whipple remarked upon the reversal of the north-south component at 10,000 feet. Captain Pick asked if the author had discovered any general rule by which the wind at 3,000 feet could be deduced from that at 500 feet. On the western front there was a persistent westerly drift between 20,000 and 30,000 feet and it would be interesting to know if this feature was observed in Palestine. He suggested deducing temperature gradients from a correlation of surface temperatures with sky face.

A paper by Mr. E. J. Bilham, B.Sc., was entitled "Barometric pressure and underground water-level." The results recently obtained from a study of an experimental wall with autographic registration at Kew Observatory, Richmond, Surrey, were compared with some earlier records obtained by Dr. Isaac Roberts at Maghull, near Liverpool, and by Prof. K. Honda in the neighbourhood of Tokyo, in Japan. As at Kew, the sensitiveness of the water surface at Maghull to pressure changes varied considerably, high sensitiveness being associated with saturation of the soil by previous heavy rainfall. In Japan it was found that in surface wells the water level was not affected by pressure changes, sensitiveness being exhibited by deep artesian wells only. Prof. Honda had pointed out that by determining the sensitiveness of a well to barometric pressure, the extent to which pressure changes affect strata at a given depth below the surface can be deduced. Data for Japan and the British Isles obtained in this way showed marked points of difference.

The following candidates were balloted for and elected fellows of the Society :—Mr. W. Andrews, Lt. C. A. Brook, R.A.F., Capt. R. A. Cochrane, R.A.F., Mr. J. L. Copp, Mr. F. Cruickshank, Capt. I. G. Le R. Diamond, Capt. C. K. M. Douglas, Lt. C. W. Duffield, Lt. F. J. Goodfellow, Mr. R. F. T. Granger, Flt.-Lt. S. B. Holloway, Flt.-Lt. T. C. B. Hooke, Lt. A. W. Isherwood, Mr. W. C. Kaye, Mr. E. W. Kitchin, C.E., Mr. R. Knight, Dr. V. F. V. Lindholm, Dr. S. F. Linton, Lt. A. W. Mackay, Mr. D. J. Mares, Mr. S. Mortimer, Mr. W. B. Murphy, Mr. F. H. Newman, Dr. V. V. Pamana-Sastrin, Lt. R. Stewart and Mr. T. J. Williams.

REVIEWS.

The Study of the Weather. By E. H. CHAPMAN, M.A., B.Sc. Cambridge University Press. Large crown 8vo., pp. xii. + 132. Illustrated. Price, 3s. 6d. net.

MR. CHAPMAN combines the practical experience of the meteorologist, having served on the western front as meteorological officer to the Fifth Army, with a knowledge of just what the schoolmaster wants. The latest volume of the Cambridge "Nature Study Series," is an admirable introduction to the study of meteorology, and should be useful in stimulating interest in the subject where-ever it forms part of the school curriculum. From the selection and orientation of an observation post the student is taught to make weather observations, to study cloud forms and sky signs, and to record instrumental observations. The principle and construction of the rain gauge, thermometer and barometer are explained with the aid of laboratory apparatus. It is to be regretted that the author advocates the use of a home made rain gauge constructed to a bad design, which would certainly give rise to loss by out-splashing and failure to catch snow. The construction of weather charts is explained simply, and the cyclone and anticyclone are described. The last chapter introduces the absorbing subject of weather forecasting. Exercises and problems of a varied character are continuously presented to the scholar and the value of the volume is enhanced by many excellent maps and illustrations.

H.E.C.

Principles of Meteorology. By Capt. G. Ota. Tokyo, 1919. Pp. 12 and 5 plates.

CAPT. G. OTA knows all about meteorology. He says so. "I have found the principles and origins of the phenomena of meteorology and that will explain enough all ambiguous points of meteorology." This book appears to be the fruits of twenty years' study as a mariner who has "navigated to and fro nearly every sea." It consists of but twelve slender pages (giving an allowance of about sixteen lines of letterpress per year of experience).

"Spiral ascendant currents" are to Captain Ota what King Charles's head was to Mr. Dick—as David Copperfield says of this, in regard to the memorial, "I thought I saw some allusion to it in one or two places."

The conclusion is all-sufficient, "There is no meteorological phenomenon, but that caused by the spiral ascendant currents, which cause nearly all of clouds, thunder, rain, fog, etc., or they are the part of the spiral ascendant currents. This theory explains every ambiguos (*sic*) meteorological question quite plain."

The illustrations are referred to as "imaginary plans," a truly happy description.

C.S.

METEOROLOGICAL NEWS AND NOTES.

Dr. C. Chree, F.R.S., has been awarded the Hughes Medal of the Royal Society.

Sir Napier Shaw will deliver a course of nine lectures on "A General Survey of the Globe and its Atmosphere," at the Meteorological Office, at 3 p.m. on Fridays, beginning on January 23rd. Admission is free.

The Symons Gold Medal for 1920, has been awarded by the Council of the Royal Meteorological Society to Dr. H. H. Hildebrandsson, of Upsala University, in recognition of his distinguished work in connection with meteorological science.

Meteorological Office Appointments.—The following appointments are notified. Major C. P. Hearle, as Superintendent to establish a meteorological station at Malta. Comm. L. A. Brooke-Smith, R.D., R.N.R., as Superintendent of the Marine Division. Mr. J. S. Dines, as Superintendent in charge of forecasting at headquarters.

Meetings at the Meteorological Office.—On page 106 of the October number of this magazine the dates of informal meetings at the Meteorological Office for the discussion of contributions to current meteorology in colonial and foreign journals were inadvertently given erroneously. The correct dates during 1920 are January 12th and 26th, February 9th and 23rd, and March 8th and 22nd.

The Congress of Directors of Independent Meteorological services recently decided at Paris, by a majority, that the millibar should be adopted in preference to the millimetre of mercury for use in stating the pressure of the atmosphere.

The Directors of Science in Congress assembled,
Agreed that in future no discord should mar
The values of pressure so often dissembled
By units derived from a platinum bar.
The inch and the metre and gravity trembled,
As into the Congress there tripped lightly skipping
An innocent damsel who'd just 'scaped a whipping;
Her name in plain English was Miss Milly Barr.
Dear Milly Barr
Bjerknesian star;
A thousand of you
Shall be ever our cue,
As our standard of pressure wherever we are.

E.G.

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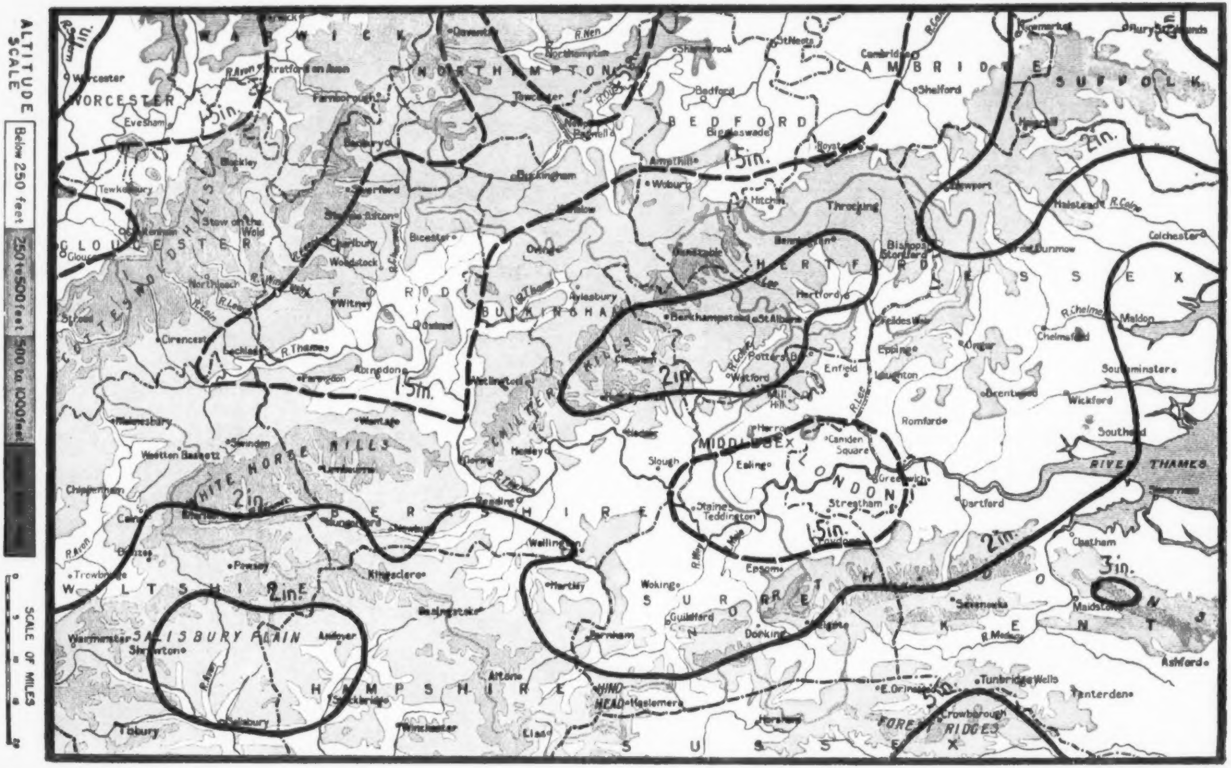
THAMES VALLEY RAINFALL NOVEMBER, 1919.



THE WEATHER OF NOVEMBER.

THE most prominent feature was the unusually severe frost which prevailed in and around the second week, when the majority of places in North Britain recorded temperatures which had not hitherto been observed in November for at least half a century. The month opened with cold easterly and north-easterly winds, but it was not until after the 7th or 8th that the thermometer descended to an exceptionally low level. The sharpest frosts appear to have occurred between the 12th and 15th, when the sheltered thermometer fell slightly below 20° over Eastern and Central England, below 15° at many stations in the western parts of the United Kingdom, and below 10° in Scotland. On the night either of the 13th or 14th a minimum reading of 8° was recorded at Nairn, and 6° at Crieff, while at Balmoral and West Linton the thermometer in the screen recorded 6° below zero F., the minimum on the grass at the former station being 6° below the shade temperature. At many places in the inland parts of Scotland the thermometer on the 14th and 15th remained at least 5° below freezing point all day, and at Balmoral the maximum reading on the 14th was only 10°. The weather during this very cold period was at first fairly dry, but with the advance of a complex cyclonic disturbance, which drifted slowly eastward across the British Isles, snow or sleet fell in all districts; in Scotland the depth of snow in level places was over 6 inches, and at Balmoral as much as 17 inches. Thunder and lightning occurred in the north of Ireland on the 7th and 8th.

The bitter wintry weather was due largely, if not primarily, to the presence of an area of high barometric pressure over the Icelandic region. After the middle of the month, when depressions began to appear in the far north the conditions resumed a more normal character, and, with a shift of wind to the west, temperature rose gradually, but very decidedly. Between the 17th and 19th, and again between the 22nd and 24th, shade maxima exceeding 50° were recorded in most districts, and on the 23rd the thermometer in many places rose considerably above 55°, a reading of 63° being observed at Killarney. In the third week heavy rain fell in Scotland, and on the 20th thunderstorms occurred in Lancashire and North Wales. Towards the close the wind veered, first to the north-west and afterwards to the north, and the weather again became cold, with snow or sleet in several places, and thunderstorms on the 28th in the south-west of England.

The total duration of bright sunshine was in excess of the average in most of the western and northern districts; elsewhere there was as a rule, a slight deficiency.

The rainfall of the month was irregularly distributed, being little more than half the average over a portion of the Thames Valley and in the south of Ireland, but approaching twice the average in the north-east of England, Berwickshire and Aberdeenshire. Rather less than an inch fell in the Upper Severn Valley and less than 2 inches over nearly the whole of the Midland and south-eastern counties, the total rising to more than 6 inches in isolated parts of the Devon-Cornwall peninsula, over a large portion of Wales, and in the Lake District where several stations had more than 10 inches. Over Scotland the normally dry areas in the east showed the greatest excess over the average. Only a small strip bordering the Solway Firth had less than 3 inches, and the greater part of Scotland had more than 5 inches. In part of the Highlands the total reached 8 inches. Over Ireland a large area had less than 2 inches. Elsewhere from 2 to 4 inches fell, except in the west and north where several stations had 6 inches; 8 inches was exceeded in the mountains of Connemara. The general rainfall expressed as a percentage of the average was as follows: England and Wales, 82; Scotland, 110; Ireland, 79; British Isles, 91.

In London (Camden Square) the mean temperature was 38°·9, or 4°·6 below the average. Duration of rain 56·8 hours. Evaporation ·08 inch. Taken together October and November had a mean temp. of 42°·3, the lowest in the 62 years' record, the nearest approach being 43°·1 in 1887.

RAINFALL TABLE FOR NOVEMBER, 1919.

STATION.	COUNTY.	RAINFALL. Aver. 1875—1909. in.	1919. in.	Diff. from Av. in.	Per cent. of Av.	Max. in 24 hours. in.	Date.	No. of Days
Camden Square	*London*	2·34	1·38	— ·96	59	·22	30	23
Tenterden	*Kent*	3·07	2·23	— ·84	73	·38	28	24
Arundel (Patching)	*Sussex*	3·54	2·00	—1·54	56	·38	28	17
Fordingbridge (Oaklands)	*Hampshire*	3·41	2·27	—1·14	67	·54	30	18
Oxford (Magdalen College)	*Oxfordshire*	2·25	1·16	—1·09	52	·31	30	19
Wellingborough	*Northampn*	2·22	1·32	— ·90	59	·36	2	20
Bury St. Edmunds (Westley)	*Suffolk*	2·40	2·21	— ·19	92	·43	17	21
Geldeston [Beccles]	*Norfolk*	2·49	2·07	— ·42	83	·38	2	19
Polapit Tamar [Launceston]	*Devon*	4·07	5·53	+1·46	136	1·12	9	21
Rousdon [Lyme Regis]	,,	3·51	2·47	—1·04	70	·65	30	18
Ross (Birchlea)	*Herefordshr.*	2·77	1·36	—1·41	49	·33	28	21
Church Stretton (Wolstaston)	*Shropshire*	2·94	1·49	—1·45	51	·25	24	20
Boston	*Lincoln*	2·05	2·09	+ ·04	102	·33	3	23
Worksop (Hodsock Priory)	*Nottingham*	1·98	1·65	— ·33	83	·31	3	24
Mickleover Manor	*Derbyshire*	2·21	2·25	+ ·04	102	·40	17	20
Congleton (Buglawton Vic.)	*Cheshire*	2·61	2·27	— ·34	87	·65	17	24
Southport (Hesketh Park)	*Lancashire*	3·16	2·20	— ·96	70	·41	16	16
Wetherby (Ribston Hall)	*York, W.R.*	2·34	1·97	— ·37	84	·57	16	...
Hull (Pearson Park)	,, *E.R.*	2·34	2·98	+ ·64	127	·45	3	27
Newcastle (Town Moor)	*North'land*	2·63	4·48	+1·85	170	·44	9	27
Borrowdale (Seathwaite)	*Cumberland*	13·59	11·70	—1·89	86	...	...	...
Cardiff (Ely)	*Glamorgan*	4·08	3·89	— ·19	95	·81	30	21
Haverfordwest	*Pembroke*	5·16	3·32	—1·84	64	...	...	17
Aberystwyth (Gogerddan)	*Cardigan*	4·50	...	...	...	...	...	..
Llandudno	*Carnarvon*	3·19	1·86	—1·33	58	·28	19	19
Cargen [Dumfries]	*Kirkcudbrt.*	4·35	3·51	— ·84	81	·39	11*	18
Marchmont House	*Berwick*	3·21	6·27	+3·06	195	1·04	25	24
Girvan (Pinmore)	*Ayr*	5·24	4·48	— ·76	86	·70	30	17
Glasgow (Queen's Park)	*Renfrew*	3·63	4·64	+1·01	128	·95	18	16
Islay (Eallabus)	*Argyll*	5·33	5·47	+ ·14	103	·89	23	18
Mull (Quinish)	,,	6·24	4·77	—1·47	76	·64	17	17
Loch Dhu	*Perth*	8·36	7·05	—1·31	84	1·00	16	16
Dundee (Eastern Necropolis)	*Forfar*	2·62	4·77	+2·15	182	·90	23	23
Braemar	*Aberdeen*	3·76	6·25	+2·49	166	·90	9	20
Aberdeen (Cranford)	,,	3·29	5·33	+2·04	162	1·11	7	23
Gordon Castle	*Moray*	2·85	4·51	+1·66	158	...	...	...
Drumnadrochit	*Inverness*	3·41	4·44	+1·03	130	·80	26	17
Fort William	,,	7·55	6·69	— ·86	89	1·25	17	19
Loch Torridon (Bendamph)	*Ross*	8·90	6·54	—2·36	73	1·15	17	16
Dunrobin Castle	*Sutherland*	3·25	4·27	+1·02	131	·75	18	15
Glanmire (Lota Lodge)	*Cork*	4·45	2·25	—2·20	51	·73	30	13
Killarney (District Asylum)	*Kerry*	5·54	3·97	—1·57	72	·70	9	16
Waterford (Brook Lodge)	*Waterford*	3·80	1·63	—2·17	43	·50	30	16
Nenagh (Castle Lough)	*Tipperary*	3·88	2·53	—1·35	65	·49	24	14
Ennistymon House	*Clare*	4·62	3·49	—1·13	76	·54	19	16
Gorey (Courtown House)	*Wexford*	3·41	3·33	— ·08	98	·82	28	22
Abbey Leix (Blandsfort)	*Queen's Co.*	3·28	1·79	—1·49	55	·44	30	17
Dublin (FitzWilliam Square)	*Dublin*	2·64	3·01	+ ·37	114	·60	14	22
Mullingar (Belvedere)	*Westmeath*	3·38	1·89	—1·49	56	·37	9	15
Crossmolina (Enniscoe)	*Mayo*	5·75	5·62	— ·13	98	·70	8	20
Cong (The Glebe)	,,	5·00	...	...	...	...	...	...
Collooney (Markree Obsy.)	*Sligo*	4·02	4·21	+ ·19	105	·83	25	18
Seaforde	*Down*	3·86	2·48	—1·38	64	·56	30	16
Ballymena (Harryville)	*Antrim*	3·95	3·93	— ·02	99	·78	23	19
Omagh (Edenfel)	*Tyrone*	3·66	4·42	+ ·76	121	·90	23	20

*17 & 30.

SUPPLEMENTARY RAINFALL, NOVEMBER, 1919.

Div.	STATION.	Rain inches.	Div.	STATION.	Rain inches
II.	Sevenoaks, Speldhurst Close.	2·38	XI.	Lligwy	2·59
,,	Ramsgate	3·65	,,	Douglas, Isle of Man	...
,,	Hailsham	4·24	XII.	Stoneykirk, Ardwell House...	3·47
,,	Totland Bay, Aston House...	2·10	,,	Carsphairn, Shiel	6·33
,,	Stockbridge, Ashley	2·00	,,	Langholm, Drove Road	4·97
,,	Grayshott	2·30	XIII.	Selkirk, The Hangingshaw..	4·63
,,	Upton Nervet	1·92	,,	North Berwick Reservoir	5·32
III.	Harrow Weald, Hill House...	1·80	,,	Edinburgh, Royal Observaty.	4·99
,,	Pitsford, Sedgebrook	1·57	XIV.	Biggar	4·07
,,	Woburn, Milton Bryant	1·61	,,	Maybole, Knockdon Farm ...	3·37
,,	Chatteris, The Priory	1·50	XV.	Shiskine	4·08
IV.	Elsenham, Gaunts End	2·43	,,	Ardgour House	9·06
,,	Rayleigh	1·55	,,	Oban	5·68
,,	Colchester, Hill Ho., Lexden	1·70	,,	Holy Loch, Ardnadam	5·32
,,	Aylsham, Rippon Hall	3·09	,,	Loch Venachar	4·80
,,	Swaffham	2·61	XVI.	Glenquey	5·80
V.	Bishops Cannings	2·39	,,	Loch Rannoch, Dall	5·70
,,	Weymouth	2·96	,,	Aberfeldy, Dunros	5·15
,,	Ashburton, Druid House	5·43	,,	Coupar Angus	4·29
,,	Cullompton	2·55	,,	Montrose, Sunnyside Asylum.	3·98
,,	Lynmouth, Rock House	4·02	XVII.	Balmoral	5·85
,,	Okehampton, Oaklands	...	,,	Fyvie Castle	4·78
,,	Hartland Abbey	3·67	,,	Keith Station	5·78
,,	St. Austell, Trevarna	4·86	XVIII.	Rothiemurchus	...
,,	North Cadbury Rectory	2·42	,,	Loch Quoich, Loan	14·25
VI.	Clifton, Stoke Bishop	1·99	,,	Skye, Dunvegan	5·96
,,	Ledbury, Underdown	1·44	,,	Fortrose	3·65
,,	Shifnal, Hatton Grange	1·57	,,	Glencarron Lodge	7·40
,,	Droitwich	·83	XIX.	Tongue Manse	6·56
,,	Blockley, Upton Wold	1·78	,,	Melvich	6·41
VII.	Grantham, Saltersford	1·92	,,	Loch More, Achfary	10·00
,,	Louth, Westgate	2·56	XX.	Dunmanway, The Rectory ..	3·22
,,	Mansfield, West Bank	2·21	,,	Mitchelstown Castle	2·32
,,	Derby, Midland Railway	1·77	,,	Gearahameen	6·20
VIII.	Nantwich, Dorfold Hall	2·04	,,	Darrynane Abbey	3·56
,,	Bolton, Queen's Park	4·03	,,	Clonmel, Bruce Villa	1·85
,,	Lancaster, Strathspey	2·43	,,	Roscrea, Timoney Park	1·55
IX.	Langsett Moor, Up. Midhope	3·39	,,	Broadford, Hurdlestown	2·64
,,	West Witton	3·69	XXI.	Enniscorthy, Ballyhyland...	..
,,	Scarborough, Scalby	4·07	,,	Rathnew, Clonmannon	3·75
,,	Ingleby Greenhow	3·50	,,	Hacketstown Rectory	2·12
,,	Mickleton	3·57	,,	Ballycumber, Moorock Lodge	1·64
X.	Bellingham, High Green Manor	6·11	,,	Balbriggan, Ardgillan	2·12
,,	Ilderton, Lilburn Cottage	5·69	,,	Castle Forbes Gardens	2·14
,,	Keswick, The Bank	3·92	XXII.	Ballynahinch Castle	4·55
,,	Orton	6·12	,,	Woodlawn	2·75
XI.	Llanfrechfa Grange	2·61	,,	Westport House	5·18
,,	Treherbert, Tyn-y-waun	6·04	,,	Dugort, Slievemore Hotel ...	...
,,	Carmarthen, The Friary	3·24	XXIII.	Enniskillen, Portora	3·45
,,	Fishguard, Goodwick Station.	3·03	,,	Dartrey [Cootehill]	2·05
,,	Crickhowell, Tal-y-maes	6·50	,,	Warrenpoint, Manor House ..	2·03
,,	Birmingham WW., Tyrmynydd	4·93	,,	Belfast, Cave Hill Road	3·94
,,	Lake Vyrnwy	4·55	,,	Glenarm Castle	4·12
,,	Llangynhafal, Plas Drâw	2·70	,,	Londonderry, Creggan Res...	4·44
,,	Rhiwbryfdir	5·86	,,	Milford Manse	5·25
,,	Dolgelly, Bryntirion	4·59	,,	Killybegs	7·09

Climatological Table for the British Empire, June, 1919.

STATIONS. (*Those in italics are South of the Equator.*)	Absolute. Maximum. Temp.	Absolute. Maximum. Date.	Absolute. Minimum. Temp.	Absolute. Minimum. Date.	Average. Max.	Average. Min.	Average. Dew Point.	Average. Humidity.	Absolute. Max. in Sun.	Absolute. Min. on Grass.	Total Rain. Depth.	Total Rain. Days.	Aver. Cloud.
	°		°		°	°	°	0-100	°	°	inches		
London, Camden Square	84·9	11	41·0	27	72·3	50·7	49·2	63	127·0	36·5	1·51	9	5·4
Malta	95·0	24	61·0	1, 2	80·6	65·9	...	79	144·0	...	·00	0	3·5
Lagos	87·3	2	71·0	21	84·3	74·7	73·6	80	157·3	60·0	8·31	14	7·6
Cape Town	75·9	2	37·1	28	64·1	49·6	50·2	80	...	...	2·99	12	5·6
Johannesburg	73·2	26	36·4	10	62·9	42·9	35·6	62	...	29·3	·00	0	2·4
Mauritius	79·2	13	58·5	19	76·8	64·8	62·8	78	..	52·5	2·36	10	6·4
Bloemfontein	73·9	7	24·3	22	65·3	36·4	34·2	65	...	...	·00	0	3·0
Calcutta...	100·6	2	75·2	1	89·9	79·1	78·4	86	...	71·5	12·94	15	7·0
Bombay	94·0	2	75·6	26	88·4	80·6	77·5	81	134·8	71·3	23·35	20	7·6
Madras	105·0	18	70·2	3	98·8	80·0	70·3	61	159·1	70·5	2·49	13	7·1
Colombo, Ceylon ...	87·7	2, 3	73·7	28	85·9	77·9	75·0	82	151·9	72·0	3·59	19	8·3
Hongkong	90·6	26	76·2	1	87·0	79·4	76·8	83	...	...	10·82	17	7·4
Melbourne	67·2	1	35·0	4	57·1	44·2	42·4	72	106·6	29·0	1·25	15	6·0
Adelaide	72·1	8	38·6	24	63·6	48·6	47·2	72	127·0	27·3	1·78	14	5·5
Perth	79·2	4	39·4	18	64·6	49·1	...	...	129·7	30·7	5·69	16	5·7
Coolgardie	74·8	5	35·8	21	63·6	44·5	42·0	60	132·8	33·2	1·07	3	5·0
Brisbane	77·1	16	43·4	20	69·0	53·6	50·9	68	128·9	32·0	·78	11	4·4
Hobart, Tasmania ..	64·5	1	33·4	30	53·9	43·2	38·8	66	105·7	28·8	3·28	19	6·7
Wellington ...	65·9	12	29·9	1	54·9	43·0	42·5	79	114·0	...	2·44	15	5·2
Jamaica, Kingston ..	92·1	10	72·2	25	88·8	74·4	72·0	77	...	...	·45	3	5·6
Grenada	87·0	4	72·0	8	84·0	75·0	...	76	134·0	...	4·39	18	5·0
Toronto	94·4	14	47·2	28	83·4	61·3	60·2	70	129·9	43·2	2·72	8	2·9
Fredericton	90·0	6	30·0	1	75·4	48·0	52·4	65	...	...	2·33	6	3·7
St. John, N.B. ...	83·5	4	37·3	1	64·7	47·6	48·2	76	132·6	33·7	2·90	10	5·0
Victoria, B.C.	70·0	12	42·8	7	61·8	46·9	45·0	73	137·0	36·0	·53	7	4·6

Johannesburg.—Bright sunshine, 260·0 hours.

Mauritius.—Mean temp. 1°·1 above, dew point 1°·6 above, relative humidity 1·3 above, and R ·43 in. below, averages.

COLOMBO, CEYLON.—Mean temp. 0°·3 above, dew point 0°·3 below, and R 3·72 in. below, averages. Mean velocity of wind 6·6 miles per hour, prevailing direction W.S.W.

HONGKONG.—Bright sunshine, 203·5 hours. Mean velocity of wind 8·4 miles per hour, prevailing direction S. Mean temperature 82°·6.

Adelaide.—R 1·31 in. below normal.

Perth.—R 1·32 in. below normal.

Coolgardie.—R 0·17 in. below normal.

Wellington.—Bright sunshine 134·3 hours. R 2·62 hours below average.

Cloud. | Aver.

5·4
3·5
7·6
5·6
2·4
6·4
6·0
7·0
7·6
7·1
3·3
7·4
6·0
5·5
5·7
5·0
4·4
6·7
5·2
5·6
5·0
2·9
3·7
5·0
4·6

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